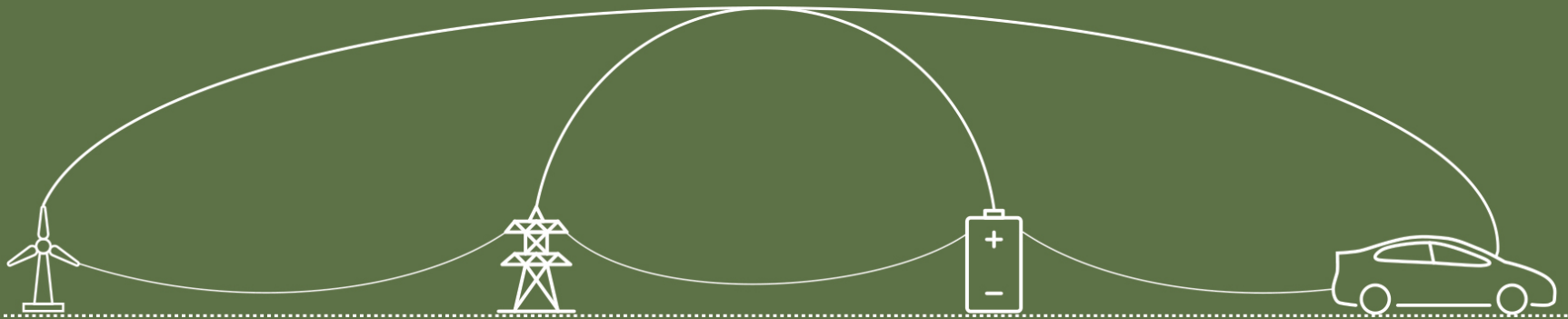




EV Grid Integration to Support a Decarbonizing Grid

Thomas Ashley – Senior Director, Government Affairs & Public Policy

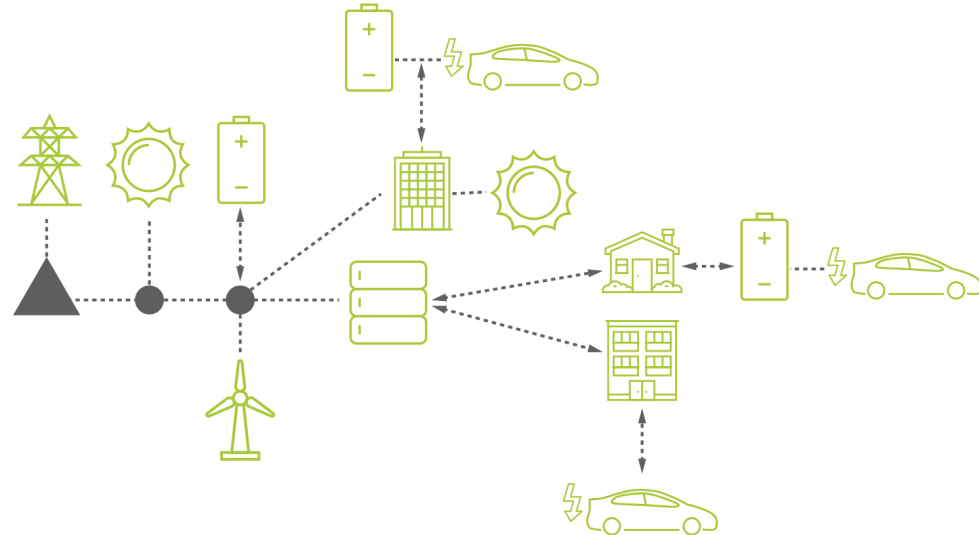


Utility Planning for EV Infrastructure & DER Management

Utilities must proactively define their strategies around both EV charging and the larger DER management space

Visibility of responsive loads and resources is essential for effective management

Open communication standards insure assets are future-proofed within the bounds of rapid technology development



Intelligent Near-term Infrastructure Investments Can Reduce Long-term Costs



Aggregation in most grid services requires limited to no capital costs, software and/or communication upgrades, and/or vehicle modification



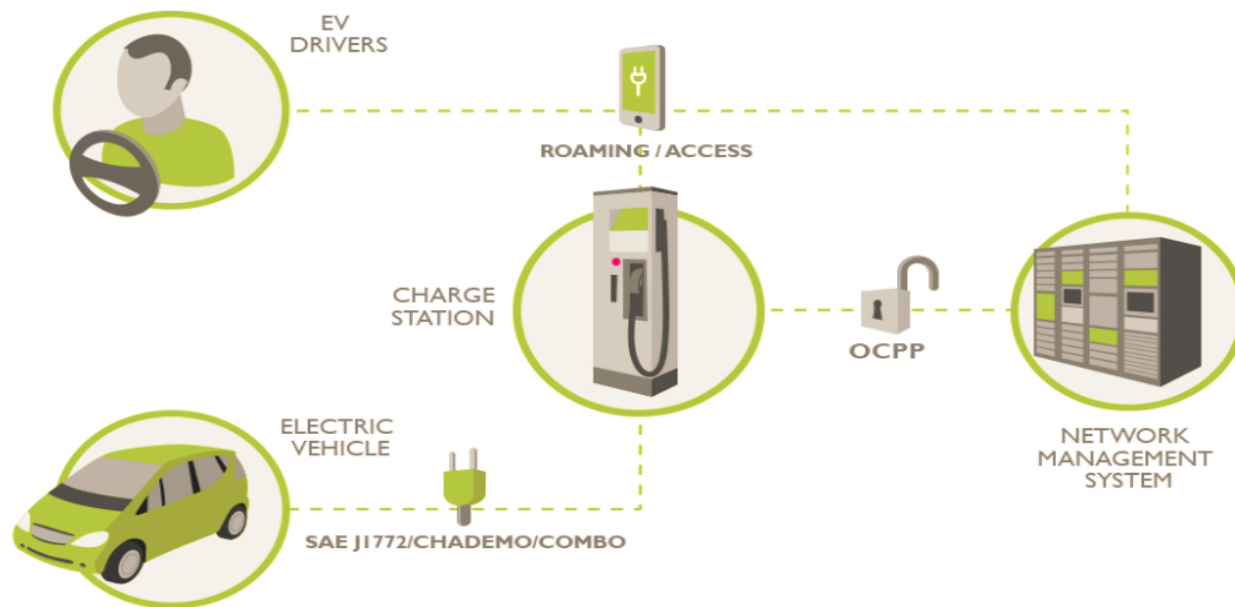
Load may be influenced to charge during overproduction of solar, wind or hydro; load can be located closer to generation resources minimizing line losses



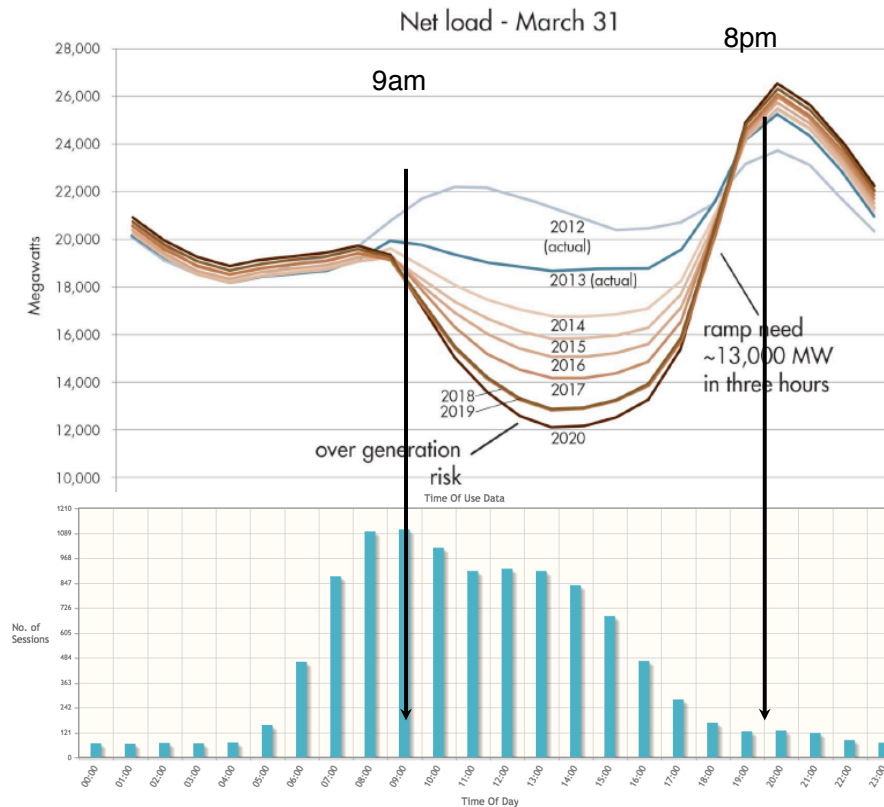
Workplace charging development can mitigate locational residential and grid asset threats

Source: Navigant Research

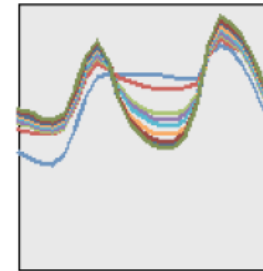
Open Standards & Interoperability



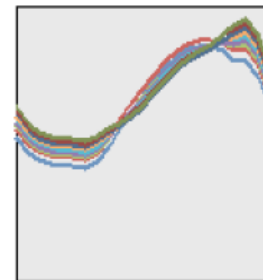
EV Charging as Renewable Following



Winter - January 31st



Summer - August 10th



Southern California Edison Demand Response Charging Pilot

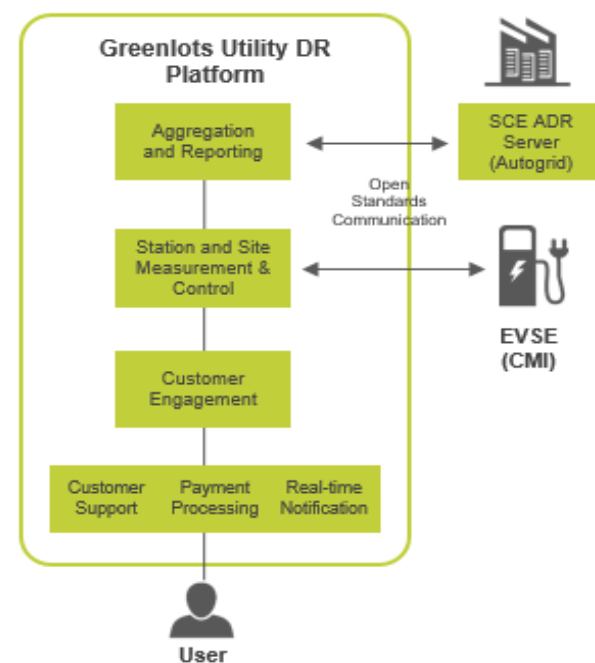
SCE deployed 80 Level 2 EVSEs across 9 facilities with Greenlots providing:

1. Time-of-use and multi-tiered premium pricing to simulate critical peak pricing scenarios
2. Day-ahead and day-of dispatch and curtailment of charging stations
3. Post-charging occupancy fee for space management
4. Web-based platform with real-time data, reports and analytics
5. Real-time messaging to communicate with drivers
6. Applying standard DR message protocols for the first time on PEV charging

Key Takeaways:

1. PEV charging is an effective addressable load for demand response:
 - a. High average curtailment: 3.4 kW from each Level 2 station (nearly 3x residential A/C load)
 - b. High participation: 72-76% drivers consistently opted-in
 - c. Participation did not vary significantly from peak to off-peak times
 - d. Timing of workplace charging overlaps with peak grid use
2. Workplace charging is key enabler for EV adoption
 - a. PEV ownership jumped by 490% from employees surveyed before and after pilot

Pilot Technology Architecture



Piloting Using EVs for Wind Energy Storage

Project

German Ministry of Energy funded Project for Smart Charging

Objective

Managed (scheduled) charging to absorb excess wind energy at night

Status

Successfully completed: August 2011 – March 2012

Greenlots was selected in 2011 to work with Vattenfall, BMW, and Daimler on a landmark smart grid project for the German Government in Berlin and Hamburg.

The project was a commercial demonstration of using EV battery capacity to absorb excess wind power at night, a growing issue in Germany. 65 Daimler Vito E-Cell and 25 BMW ActiveE vehicles were connected to the Vattenfall back-end and would charge according to the forecast wind energy generation for that night.

Greenlots provided the HomePlug AV-enabled EVSE and played an integral part in system integration and testing, while Vattenfall provided control and grid software. When an EV plugged in, a real-time association between the EVSE to EV was performed over power line communications (PLC), and a charging instruction profile was downloaded to the EV. In 0.5A increments, the charging could be adjusted up or down. This project contributed to the formation of the HP-GP (HomePlug GreenPHY) standard now used for the CCS connector standard and ISO/IEC 15118.



Mercedes-Benz



LAPD Fleet Charging

Los Angeles Sustainability Plan (pLAn)

- 50% of new city fleet vehicles to be electric by 2017. 80% of new fleet vehicles by 2025.
- LAPD is the largest fleet in the city and the first department to “go electric” with the first 100 of 500 EVs in total.
- The LAPD charging hub will be a central node that is part of a larger charging ecosystem.
- Building on open standards allows hardware to be selected based on specific site requirements.

Efficient Fleet Charging

- 100 Level 2 and 4 DC Fast Chargers at one location
- Load management software avoids expensive electrical infrastructure upgrades and reduces demand charges
- Responds to real-time electricity demand of building
- Charge optimization algorithms with prioritization ensures vehicles are charged when they are needed
- Fleet reporting tracks fleet data, operating cost and efficiencies of an all electric fleet.



Hawaiian Electric DCFC with Storage Integration for Infrastructure Offset



Project

DCFC with integrated storage to limit demand on grid. Greenlots provided the network management and software integration, including monitoring of battery data

Objectives

- Deploy a storage supported 50kW DCFC with max 23kW grid demand
- Observe performance of DCFC under real world use
- Assess applicability of overall solution as strategy for demand charge reduction

Timing

Now live thru 2017



Thomas Ashley – Senior Director,
Government Affairs & Public Policy

tom@greenlots.com

m 802.922.5585

